MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2015/2016

TIS3351 – Advanced Database

(All sections / Groups)

9th MARCH 2016
2.30 pm – 4.30 pm
(2 hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 7 pages, including the cover page, with four questions only.

2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please print all your answers in the answer booklet provided.

PART A: ANSWER ALL QUESTIONS [30 marks]

The following is a relational schema of a training center, *SmartTrainer Youngster*. The primary key for all the relations are underlined and the foreign keys are in *italic*.

Student (StudentID, StudentName, Phone, Address, Email)

Course (CourseID, CourseName, Category)

Instructor (InstructorID, InstructorName, Contact, Email, *DeptCode*)

Department (DeptCode, DeptName)

Section (SectionID, *CourseID*, SectionName, *InstructorID*, Day, Time)

Attendance(AttendanceID, *StudentID, SectionID*, AttendanceDate, Venue, Hour)

Enrollment (EnrollID, *SectionID*, *StudentID*, EnrollDate, AcademicYear, Term)

Based on the relational schema of *SmartTrain Youngster*, answer Questions 1 to 3.

Question 1 [10 marks]

a) Assuming that tables *Course* and *Instructor* have been created, write the SQL command to create table *Section*. The data types or constraints of the table are shown below:

Attribute	Data Type / Constraint
SectionID	Identity column with the starting value of 100, and increased by 1 for each new row entered.
CourseID	The ID of the course which generates a section.
SectionName	The name of the section.
InstructorID	The ID of the instructor in the class. Should not accept any null value
Day	Day in a week when the class is conducted. Ensure that it falls within the followings: MON, TUE, WED, THURS, FRI, SAT, SUN.
Time	Time of the class, e.g. 10.00.00 for 10a.m.

The SQL command must include the entity and referential integrity constraints.

[3 marks]

Continued...

b) Write a SQL command to list the attendance details for student named 'Abu Bakar Abdullah' for the course named 'Advanced Programming in C#'.

[2 marks]

c) Create a view to show the student name that does not enroll in any course for the term 'Quarter1' under academic year '2015'. Use nested queries to construct the SQL.

[2 marks]

d) Create a user-defined function (UDF) named *Venue_Statistic* that returns the following table whenever it is called. The function returns the minimum and maximum number of hours it is occupied in each venue. [3 marks]

Venue	Min_Num_Of_Hrs	Max_Num_Of_Hrs

Question 2 [10 marks]

SmartTrainer Youngster has created a data warehouse to monitor their student attendance. The attendance information is important for them to keep track of their student's participation in the class.

The table below shows some sample records in the fact table.

Fact Table – Attendance

TimeID	InstructorID	StudentID	CourseID	VenueID	Hours
1/1/15	T1002	S1001	C001	R001	12
2/1/15	T1002	S1002	C002	R001	6
4/1/15	T1001	S1001	C001	R003	4
7/1/15	T1003	S1003	C004	R002	3
7/1/15	T1003	S1004	C004	R002	6
3/1/15	T1001	S1005	C001	R004	18
2/1/15	T1002	S1004	C002	R001	24

Continued...

a) Briefly illustrate the operational and multidimensional data view of Attendance table. [2 marks]

b) Based on the fact table given above, draw the **star schema** for the data warehouse, including the dimension tables. Include the appropriate attributes in the dimension tables. [4 marks]

c) Assume there are 50 records in each of the four dimension tables. Calculate the size and storage for the fact table. (Note: Assume 8 bytes per field.) [2 marks]

d) Below are the authorization on table *DRIVER* granted to users U_1, U_2, U_3, and U_4:

From Database Administrator (DBA):

```
DBA: create role teller
DBA: create role manager

DBA: grant all privileges on DRIVER to manager with grant option

DBA: grant select on DRIVER to teller
DBA: grant update on DRIVER to teller

DBA: grant manager to U1, U2
DBA: grant teller to U3
```

From users U1 and U2:

```
U2: grant all privileges on DRIVER to U4
```

Among users U_1, U_2, U_3, and U_4, who can perform delete on table *DRIVER* and who can perform update on table *DRIVER*? [2 marks]

Delete : _____

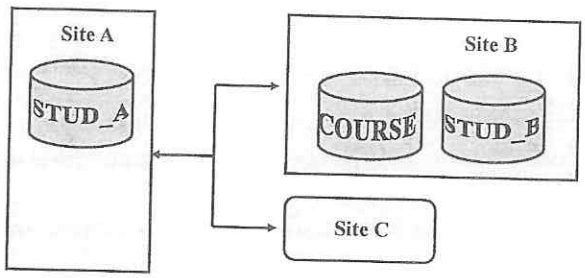
Update : _____

Continued...

Question 3 [10 marks]

a) Based on the tables as listed in page 2, assuming that *SmartTrainer Youngster* has implemented an online distant learning among its branches across Malaysia. The distributed database scenario is implemented across Site A to C, as illustrated below.

TABLES	FRAGMENTS	LOCATION
STUDENT	STUD_A	A
	STUD_B	B
COURSE	-	B



Identify the minimum operation type(s) (remote request, remote transaction, distributed transaction, or distributed request) that the distributed database management system must support in order to perform the following operations at Site A. Explain your answer.

i) SELECT * FROM Student WHERE StudentName LIKE 'A%'
UNION SELECT * FROM Student WHERE StudentName LIKE 'M%';

[1 mark]

ii) SELECT Category, COUNT(CourseID) from Course
GROUP BY Category;

[1 mark]

iii) BEGIN WORK;
UPDATE Course
SET Category = 'Engineering'
WHERE CourseName LIKE 'E%';

Alter Stud_B
Add Column City Varchar(30) WITH DEFAULT 'KL';
COMMIT WORK;

[1 mark]

Continued...

b) Assumed that *SmartTrainer Youngster* plans to migrate their database to object-oriented (OO) database. Draw the object representations to show the conceptual schema of the OO database for Student, Enrollment, Section and Course.

[4 marks]

c) *SmartTrainer Youngster* pays their instructors based on the number of classes they have conducted. As such, a temporal database to monitor this information is needed. Based on the Attendance fact table in Question 2, illustrate the TimeSheet relation to monitor the classes conducted by the instructor in *SmartTrainer Youngster*. The instructors are identified by *InstructorID*, courses are identified by *CourseID*, while the number of hours are indicated in integer.

- On 1st January, instructor T1002 conducted course C001 for 12 hours
- On 2nd January, instructor T1002 conducted course C002 for 6 hours
- From 3rd January to 4th January, instructor T1001 conducted course C001 for 18 hours and 4 hours respectively.
- On 7th January, instructor T1003 conducted two classes for course C004 for 3 and 6 hours respectively.

Illustrate the TimeSheet relation graphically. [3 marks]

Question 4 [10 marks]

a) Most applications nowadays need to store large text documents or additional data types such as audio, video, drawings, images, and a combination of text and graphics. Briefly name and describe the three main options to support large object data types.

[3 marks]

b) Give TWO differences between relational and NoSQL databases. [2 marks]

Continued...

c) Answer Question (i) to (ii) based on figure below.

```
<timetable>                                                    1
    <time id = "Q1/20015 A">                                   2
        <instructor>Gary Smith </ instructor >                 3
         <subject> Oracle Master </ subject >                  4
         <class>                                               5
            <venue>Intelligent Hall</ venue >                  6
             <day> Monday 10.00-12.00 </day>                   7
             <day> Tuesday 9.00 -11.00</day>                   8
        </class>                                               9
    </time>                                                    10
    <time id= "Q1/20015 B">                                    11
</timetable>                                                   12
```

i) There is a well- formedness error in the XML file. Identify by stating which line that which causes the error. [1 mark]

ii) Express the query to retrieve the subjects which are conducted in the venue 'Intelligent Hall' as an XPath query. [2 marks]

iii) Assuming that the well-formedness error has been fixed, represent the XML document in Edge-labeled data tree. [2 marks]

End of Page.